Asynchronous MMC Based Parallel SA Schemes For Multiobjective Standard Cell Placement

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Summary

Simulated annealing (SA) is a popular iterative heuristic used to solve a wide variety of combinatorial optimization problems. However, depending on the size of the problem, it may have large run-time requirements. One practical approach to speed up its execution is to parallelize it. In this paper we develop parallel SA schemes based on the asynchronous multiple-Markov chain model (AMMC) described in S.-Y. Lee and K. G. Lee (1996) and applied to standard-cell placement as presented in J. Chandy et al. (1997), The schemes are applied to solve the multi-objective standard cell placement problem using an inexpensive cluster-of-workstations environment. This problem requires the optimization of conflicting objectives (interconnect wire-length, power dissipation, and timing performance), and fuzzy logic is used to integrate the costs of these objectives stated in J.A. Khan et al. (2002) and S. M. Sait and H. Youssef (2001). Experiments are performed on ISCAS-85/89 benchmark circuits. Our goal is to develop parallel SA schemes that provide significantly improved runtime/solution quality characteristics for this key CAD problem, by making the best possible use of an inexpensive parallel environment.